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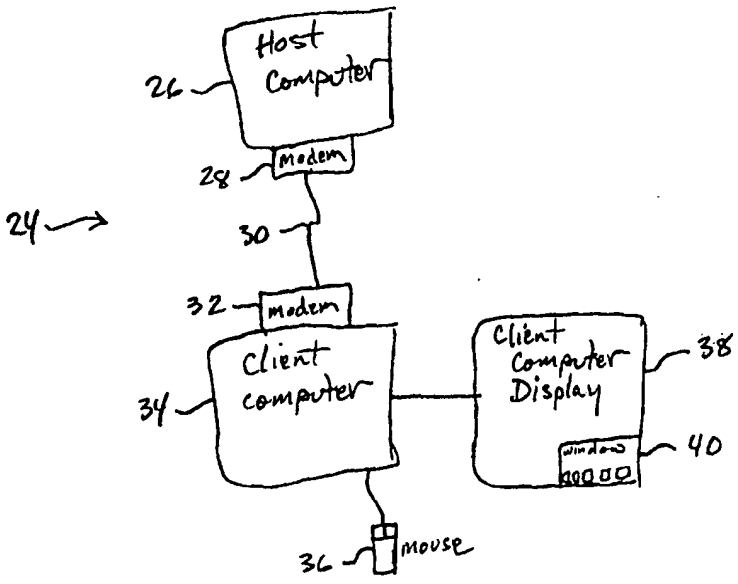

(57) Abstract

While establishing a network connection between host (26) and client (34) computers, the client (34) computer is configured so that a display window is opened and is set so that it remains visible and on top of other window displays throughout the entire network connection. The client (34) computer is programmed to periodically request new window presentation data to be presented in the display window. Host (26) computer software monitors (42) the time between requests by the client (34) computer for new window presentation data, terminating the connection (16) if a preset period of time is exceeded (14). In another aspect of the present invention, activity (18) through the network connection is monitored, and the window presentation data to be presented in the display window may be selected based upon the client's performing certain function (66, 68, 70) or reviewing certain data or data types. In another aspect of the present invention, caching of window presentation data may take place on client (34) computer in order to speed other network processes.

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SPECIFICATION

TITLE OF THE INVENTION
METHOD FOR MANAGING A NETWORK CONNECTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of computing, and more particularly describes a method for managing a network connection between host and client computers.

2. The Background Art

The Internet is a network of thousands of large, sophisticated computers connected together with high-speed data transmission lines. These sophisticated "host" computers each typically comprise hundreds or thousands of data ports, each data port either permanently connected to another smaller, personal computer, or more likely, connected to a modem. Each modem is connected to a telephone line so that an authorized user, using a communications program running on their own "client" computer, may dial into the larger computer system using a modem attached to the client computer, thus gaining access to the network.

Other types of networks having connections between host and client computers are known in the art, and include but are not limited to Local Area Networks (LAN's), for example, existing inside a particular company for the use of its employees, and also intranets, which often connect multiple LAN's together so groups of people such as employees in one division of a company may intelligently communicate and pass data between themselves and other related groups of people, such as people in a different division of the same company. These LAN's and intranet's are often connected together and to Internet Service Providers (ISP's) through high-speed data lines, providing access to the Internet for LAN and intranet-based users. Internet Service Providers are companies which provide public access through their computer systems to the Internet.

It is well known by those skilled in managing networks that a properly managed host computer modem data port may support approximately forty or more client connections, with each client computer being connected to the network

approximately 18 or fewer hours each month, taking into account a twenty-four hour day.

Various methods of managing a connection between a host computer and a client computer are known in the art. A modem-based host-client connection typically begins with the client computer initiating a telephone connection to the host using the client computer modem, and once the telephone connection is established, client and host computer modems negotiate data rates and the respective computers swapping other important data, such as login identification and password. Once the connection is fully established and client and host computers are are able to communicate digitally with each other, the method of managing the host-client connection is often limited to ensuring that the telephone connection between the two computer systems is intact, and that the proper protocols are still in force.

Some ISP's provide a service wherein, once a connection is established between the client and host computers, the connection is allowed to remain intact indefinitely. While this unlimited connection is in use, the modem line and data port is unusable for other connections, thus limiting the number of client computers that particular modem and telephone line ("modem connection") would support. Although allowing a user unlimited connectivity time may provide flexibility to the user of a client computer, it may be less than optimally efficient in that by allowing a user to remain on line indefinitely regardless of the amount or content of activity taking place, a user may dominate a valuable host computer modem connection regardless of whether the user is actively using that modem connection for data transmission.

Other ISP's manage their client-host-modem connections by monitoring the activity over the respective data port, and terminate the modem connection if a designated interval of time passes without any activity. Using this method, an ISP host computer sets and starts a countdown timer for a reasonable period of time, for instance 10 minutes, and resets the countdown timer each time data of any type is transmitted to and/or received from the host computer. If the time remaining on the countdown timer counts down to zero, the ISP host computer terminates the connection. Although useful for its intended purposes, this type of monitoring reacts to any activity, regardless of what that activity comprises. It would be

beneficial to provide a method for managing a network connection which takes into account the particular type of data being transmitted and received between client and host computers.

OBJECTS AND ADVANTAGES OF THE INVENTION

It is an object and advantage of the present invention to provide a method of managing a client-host computer modem connection which reacts to the type of activity taking place between client and host computers.

It is a further object and advantage of the present invention to provide a method for presenting client-specific information on a client computer display.

Yet a further object and advantage of the present invention is to provide a method for causing a client computer to display a message on a display associated with the client computer while the client computer is connected to the host computer, and terminating such connection if the client computer ceases to display the message.

These and many other objects and advantages of the present invention will become apparent to those of ordinary skill in the art from a consideration of the drawings and ensuing description of the invention.

SUMMARY OF THE INVENTION

While establishing an network connection between host and client computers, the client computer is configured so that a display window is opened and is set so that it remains visible and on top of other window displays throughout the entire network connection. The client computer is programmed to periodically request new window presentation data to be presented in the display window. Host computer software monitors the time between requests by the client computer for new window presentation data, terminating the connection if a preset period of time is exceeded. In another aspect of the present invention, activity through the network connection is monitored, and the window presentation data to be presented in the display window may be selected based upon the client's performing certain functions or reviewing certain data or data types. In another aspect ot the present invention, caching of window presentation data may take place on client computer in order to speed other network processes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a flow chart illustrating a conventional method of managing a network connection.

FIG. 2 is a schematic representation of a host-client computer connection and associated equipment according to a presently preferred embodiment of the present invention.

FIGS. 3A and 3B are a flow chart illustrating the steps for managing the host computer side of a network connection according to a presently preferred embodiment of the present invention.

FIGS. 4A and 4B is a flow chart illustrating the steps for managing the client side of a network connection according to a presently preferred embodiment of the present invention.

FIG. 5 is a schematic representation of a client computer display window according to an alternate embodiment of the present invention.

FIG. 6 is a flow chart illustrating the steps for utilizing tracking of disk caching data received over a network connection according to a presently preferred embodiment of the present invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

Those of ordinary skill in the art will realize that the following description of the present invention is illustrative only and is not intended to be in any way limiting. Other embodiments of the invention will readily suggest themselves to such skilled persons from an examination of the within disclosure.

FIG. 1 is a flow chart illustrating a conventional method of managing a network connection.

Referring to FIG. 1, in a conventional method, a connection between host and client computers is established in step 10. Following the establishment of a host-client connection, the host computer performs some housekeeping functions, one of which in step 12, is to set one or more timers which, by counting up or down, track the connection time and the time between periods of activity over the host-client connection. Here, it will be assumed that the timers are set for the maximum allowable time for inactivity, and maximum connection time respectively, and that the timers count down to zero.

In conventional host computers that mandate a maximum allowable connection time, step 14 tests to see if the connection time has exceeded the maximum allowable time. If yes, the connection is terminated by the host computer in step 16. If the maximum allowable time has not been exceeded, however, the method proceeds to step 18 where the host computer decides if any activity has occurred since the last reset of the activity timer. If yes, the host computer resets the activity timer in step 20 and restarts the process again by checking the connection timer in step 14. However, if no activity has occurred, the host computer then looks at the activity timer in step 22 to see if the activity timer has expired, i.e. counted down to zero. If the activity timer has expired, the user has exceeded allowable limits of inactivity, and the method proceeds to step 16 and terminates the network connection between client and host computers.

Although the conventional method is useful for its intended purposes, it fails to take into account specific conditions other than time in the management of the host-client connection. A connection between client and host computers may be more efficient and provide more utility to the user if managed by taking into account details such as whether the user is sitting at the computer, whether a

specific display window is open on the client computer display for the display of messages which may be beneficial to the user, and so forth.

The present invention provides a method of managing a network connection wherein the connection remains intact only if certain specific conditions are met. In a presently preferred embodiment of the present invention, the client computer requests window presentation data from the host computer at periodic intervals, and that window presentation data, when received by the client computer, is displayed on the client computer display. If the client computer fails to request window presentation data within a particular time period, the host computer terminates the connection.

FIG. 2 is a schematic representation of a host-client computer connection and associated equipment according to a presently preferred embodiment of the present invention.

Referring to FIG. 2, a completed host-clientcomputer connection 24 comprises a host computer 26 with data port (not shown) connected to a modem 28. A modem is an interface between the digital information the computer uses, and the audio tones commonly transmitted over telephone lines, and performs the conversion from digital form to analog form and back again, thus enabling computers to communicate over telephone lines. Modem 28 is connected to telephone or other data line 30, which is usually coupled through switching units to client computer modem 32.

The client modem performs a similar function as the host computer modem, translating data from analog form to digital form and back again. Modem 32 is connected to client computer 34, which itself is connected to a mouse 36, and a video display 138. It will become clear that, in the presently preferred embodiment of the present invention, a display window 40 is caused to open and window presentation data in video display 38. The window presentation data to be displayed is provided by the host computer at regular intervals during the time the host-client connection is intact. It is preferred that the display window on the client computer be configured such that it remains on top of all other windows, regardless of when those other windows were opened.

In an operating system such as Microsoft® Windows 95® which provides a graphical user interface which lends itself to easily opening windows and presenting data within those windows, keeping a window on top is accomplished by setting a bit in the windows status register corresponding to that window. However, in order to ensure that a later opened window which itself attempts to set the "window-on-top" bit is moved to a position behind the client computer display window, the window-on-top bit for the client computer display window must be reasserted at regular intervals. The presently preferred interval is between approximately 20 to about 40 seconds.

Those of ordinary skill in the art will readily recognize that the order of many of the steps may be modified, and some steps removed, and still accomplish the same effect. For instance, the inactivity timer and the connection timer on the host computer may be removed in favor of asking a question in the video display which the user must respond to in order to keep the host-client connection intact.

FIGS. 3A and 3B are a flow chart illustrating the steps for managing the host computer side of a network connection according to a presently preferred embodiment of the present invention.

Referring to FIG. 3A, the presently preferred embodiment of the present invention proceeds similar to the conventional method where, in step 10, the connection between host and client computers is established, and proceeding to step 12, where the connection timer and the activity timer are set. However, in the presently preferred embodiment of the present invention, the host computer software and client computer software have new unique features, as described below.

In step 42, the host computer software causes an additional "data" timer to be set up for tracking the time between requests by the client computer for window presentation data. Step 14 verifies if the connection time has been exceeded, and, if true, proceeds to step 16 to terminate the connection. If, in step 44, the maximum duration between client computer requests for window presentation are exceeded, the host computer terminates the host-client connection in step 16. If the time limit for requesting window presentation data is not exceeded, the activity timer is checked in step 22, with the same results as in the conventional method. If all

conditions for keeping the connection intact have been satisfied, the method proceeds in FIG. 3B, verifying if activity has taken place over the host-client connection in step 18.

One use for ensuring that a client computer requests window presentation data on a regular basis occurs in the advertising industry. If a client computer is connected to a host computer subsidized by advertising companies desiring to cause a particular message to be displayed on a client computer screen, the advertising company might wish to ensure that a new advertising message is requested by the client computer regularly. Once the resulting window presentation data is received from the host computer by the client computer, the message is displayed in a window on the client computer display. If a new message isn't requested frequently enough, or if the display window is closed or otherwise altered, the host computer terminates the connection.

The method of a presently preferred embodiment of the present invention proceeds in the conventional manner until step 46, where the host computer determines if a request for window presentation data has been received. If yes, the data timer is reset in step 48, and the requested data is sent to the client computer in step 50. If no, the method returns to step 14, where the connection time is compared to allowable time limits.

An alternative embodiment further comprises the host computer tracking the activity of the client computer which are distinct from network management, such activities as FTP, TELNET, and Web Browsing. Web Browsing refers to the activity performed by the user of a client computer using a computer program, commonly called a browser, such as Netscape® 3.0 or Microsoft® Internet Explorer®, to view information presented by publicly accessible Internet computer sites. This information is often interesting to a user, and a significant amount of information on nearly every topic imaginable is available.

FTP is a method used to transfer data within the internet, and the address information provided in the link information associated with window presentation data might cause the client computer to download a particular file useful to those users of client computers who desire further information about the data being displayed when the user selected the window. IRC is a method used throughout

the internet by many thousands of users to communicate to each other in "real time", sending messages to each other on public and private "channels". A user selecting a display window presenting data related to an IRC channel might then cause the IRC application to load and open communication to a particular channel on IRC.

In this alternate embodiment, the host computer would, using the standard TCP message structure, isolate the destination port used to execute a particular request, and add that port information to the user profile of the client computer. The destination port of a TCP request provides information as to the type of activity, i.e. (File transfer Protocol (FTP), TELNET, etc., being performed. Port numbers currently range from 1 to 65535, and any acceptable port number will work with the present invention. By knowing the port and thus the particular activity being requested, information from the host computer to the client computer as a result of a request for window presentation data may be tailored for particular users. thus making it more effective. If used in advertising, for example, the window presentation data sent by the host computer might be different for frequent FTP users than it is for frequent users of web browsers.

Another alternative embodiment provides that a seperate display window for presenting data need not be opened on the client computer display seperate and distinct from other windows present on the client computer display. In this alternative embodiment, the "display window" could instead be built into a Web Browser, an FTP application, an IRC application such as MIRC, or any other host-client interaction software.

FIGS. 4A and 4B is a flow chart illustrating the steps for managing the client side of a network connection according to a presently preferred embodiment of the present invention. Here, it will be assumed that the client computer is expected to display the data received from the host computer.

Referring to FIG. 4A, the host-client connection is established in step 52. Within some short interval of time after the connection is deemed established, usually within approximately ten seconds, the client computer, in step 54, is caused to request window presentation data from the host computer. Recall that this is the expected data request that will reset the data timer in the host computer, thus keeping the host-client connection intact, assuming all other conditions are met. In

step 56, a data timer is set up in the client computer so that the maximum allowable time between data requests as set on the host computer data timer will not be exceeded.

Although the client computer data timer can be set to any interval from 1 to approximately 1000 seconds and be effective in controlling the network connection, it is preferred that a host-client system requires that a window presentation data request be performed at least once every two minutes, further requiring that the client data timer should be set between approximately 30 to about 100 seconds. Setting the client computer data timer at approximately 30 seconds is preferred when the host computer data timer is set at approximately two minutes because that timing arrangement provides an opportunity for recovery in the event that the data request isn't immediately honored by the host computer. It is wise to set the data timer on the client computer to a time period which is approximately one-half of the maximum allowable time between data requests set on the host computer or less.

In step 58, the client computer determines if the data request has been honored by the host computer, and if the requested data type has been sent. If not, the method proceeds again with step 54, where the request is again sent from the client computer to the host. If the data request is honored and the data is subsequently transmitted to the client computer, the client computer is caused to perform step 60 and verifies whether a display window specifically designated for displaying the received data is open. If not, a suitable window is initialized and opened on the client computer display in step 62. If the window was opened previously, step 62 isn't performed, and the data is displayed in step 64.

Referring now to FIG. 4B, in step 66, it is determined whether the user of the client computer has selected the display window with the mouse. Typically, the selection takes place by the user clicking a mouse button one or more times in quick succession while the mouse pointer is positioned on the client computer display within the confines of the display window. Within each packet of window presentation data received from the host computer, "link information" may be found. The user, by selecting the display window as described above, may utilize that link information to perform tasks associated with the particular information.

Such a link information could be an HTTP address, pointing to a web page where further information related to the window presentation data might be stored. The link information may include a FTP address, Internet Relay Chat (IRC) channel, TELNET data, or any other application-related data usable on the client computer. In a business which has many users from different divisions on an intranet, the window presentation data in the display window on the client computer might involve the company annual report. The link information, in step 68, might cause an application on the client computer to load, and then, in step 70, further cause an electronic version of the annual report to be transmitted from a different division and acted upon using the previously loaded application.

A Web Page is a collection of text, graphics, and sometimes sound bites, put together into viewable form, and accessible to users of Web Browsers. The information is generally stored on various host computers which are connected together throughout the world, the host computers which are usually identified as the "internet" as defined earlier.

In the presently preferred embodiment of the present invention described herein, it has been assumed that the data transmitted from the host computer to the client computer is primarily video imagery. Because of this, it is important that the display window remains open on the client computer display. For this reason, step 72 verifies that the user of the client computer has not caused the window to close, and if so, step 74 terminates the host-client connection. However, if the window remains open, step 76 loops until the data timer on the client computer counts down to zero, and then initiates a new data request in step 54, beginning the client process again.

Recall that the presently preferred embodiment of the present invention being described here uses visual data from the host computer as a control mechanism. However, the method is not restricted to the data being video imagery. It is just as likely that the data type be text, a graphical display, or other type of display.

The presently preferred embodiment of the present invention involves the client computer periodically requesting and receiving data from the host computer in order that the connection between the two computers remain intact. An

alternative embodiment instead comprises the host computer periodically requesting certain data from the client computer. In this instance, the client computer may have a device such as an infrared camera or other sensory device for detecting if the user of the client computer is actually sitting at the desk or table containing the computer system. In this embodiment, the client computer would send that status information to the host computer when requested, and the host computer would maintain the host-client connection so long as certain predefined conditions were satisfied.

FIG. 5 is a schematic representation of a client computer display window according to an alternate embodiment of the present invention.

Referring to FIG. 5, a display window 78 comprises a viewing area 80, with an optional border 82, and user select buttons 84a through 84e. Although five buttons are shown, it is feasible to utilize from approximately 1 to about ten user select buttons 84a-84j per display window. User select buttons 84a-84j may be be defined in one of more data packet types received from the host computer as a result of the client request for window presentation data in step 54 of FIG. 4a, or instead be
predefined in client software to display certain information and accomplish certain tasks. An advertising company subsidizing the host computer operations might wish to use these buttons as miniature displays of company logos or other company material. The user of the client computer may then select one or more of these window presentation data-defined buttons to be immediately taken to a web page of the company whose logo appeared in the button. Those of ordinary skill int he art will readily recognize many uses for these buttons that are within the scope and spirit of the presnet invention.

FIG. 6 is a flow chart illustrating the steps for utilizing tracking of disk caching data received over a network connection according to a presently preferred embodiment of the present invention.

When using data caching in order to attempt to reduce the amount of information going accross a host-client connection, you will sometimes send a full window presentation data packet ready for display, and other times you will send a much smaller data packet which assumes that the more complete data packets is stored somewhere on the client computer. In some cases where the smaller data

packet is received which assumes the more complete data is stored, it is possible that the more complete data packet has never been received by that particular client computer. In this case, it is necessary for the client computer to request this more complete data packet.

Referring to FIG. 6, window presentation data is received in 86 by the client computer as a result of a request such as seen in step 54 in FIG. 4a. In step 88, it is determined if the received data contains all of the required information for display, i.e. whether it is the larger, more complete data ready for display, or rather the smaller referring data packet. If the data received contains all data required for display, that data is stored on the client computer in step 90, displayed in step 92, and then it is determined, in step 94, if there are too many data files stored on the client computer storage media. If yes, step 96 deletes one or more data files. this file deletion may occur by deleting all data files at once, deleting one or more files based on how long the file has existed on the client computer, or any other suitable method.

Recall in step 88, we assumed that all required data for display was contained in the data received from the host computer. If however, the smaller, more compact data packet was received, in step 98 it is determined if the more complete data file is already stored on the client computer storage media. If so, the data is retrieved, in step 100, and displayed in step 92. If not, the more complete data packet is requested from the host computer in step 110, received in step 112, and stored on the client computer in step 114. the method then proceeds by displaying the more complete data packet in step 92.

While illustrative embodiments and applications of this invention have been shown and described, it would be apparent to those skilled in the art that many more modifications than have been mentioned above are possible without departing from the inventive concepts set forth herein. The invention, therefore, is not to be limited except in the spirit of the appended claims.

What is claimed is:

1. A method for managing a connection between host and client computers, the client computer including a computer display, comprising the steps of:

establishing a connection between host and client computer systems;

opening a display window on the client computer display;

setting display window characteristics in said client computer so that said display window remains visible unless intentionally closed by a user of the client computer;

causing the client computer to request data to be displayed in said display window at periodic intervals;

causing the client computer to display said data in said display window; and

causing the host computer to terminate said host and client computer connection upon the occurrence of one of the following events:

1. if the time between client computer requests for window presentation data exceeds a predetermined period of time,

2. if a user of the client computer closes the display window,

3. if the time the host and client conputers are connected to each other exceeds a predetermined period of time.

2. The method of claim 1 wherein window presentation data is periodically stored on the client computer and triggered for display by data received by the client computer from the host computer.

3. The method of claim 1 further comprising the steps of monitoring the network activities of the client computer and targeting the content of said window presentation data to any of said activities of the client computer.

4. The method of claim 3 wherein said activities of the client computer includes File Transfer Protocol usage.

5. The method of claim 3 wherein said activities of the client computer includes Internet Relay Chat usage.

6. The method of claim 3 wherein said activities of the client computer includes Internet Relay Chat usage.

7. The method of claim 3 wherein said activities of the client computer include File Transfer Protocol usage, IRC usage, TELNET usage, and viewing web pages.

5

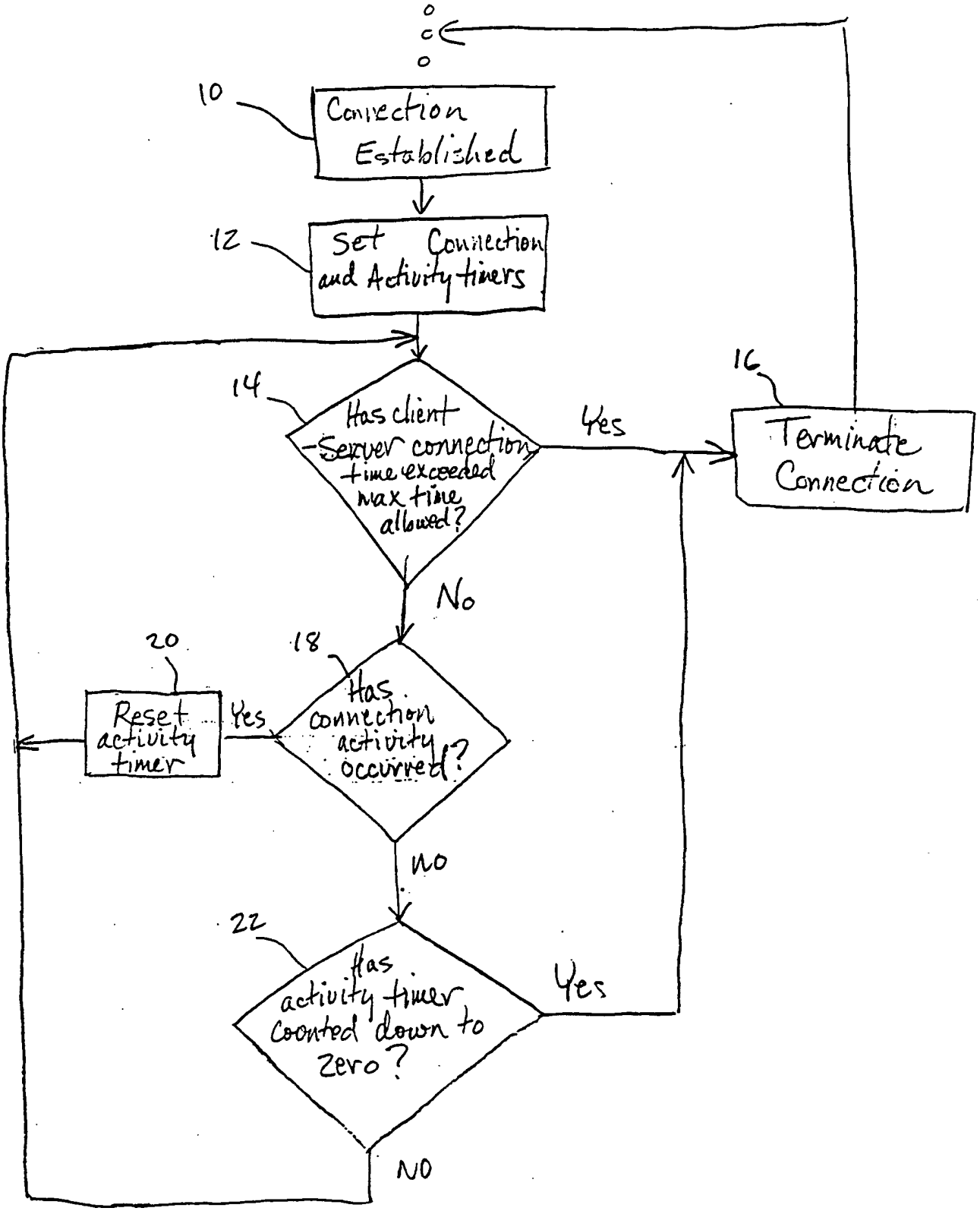

FIG. 1

Prior Art

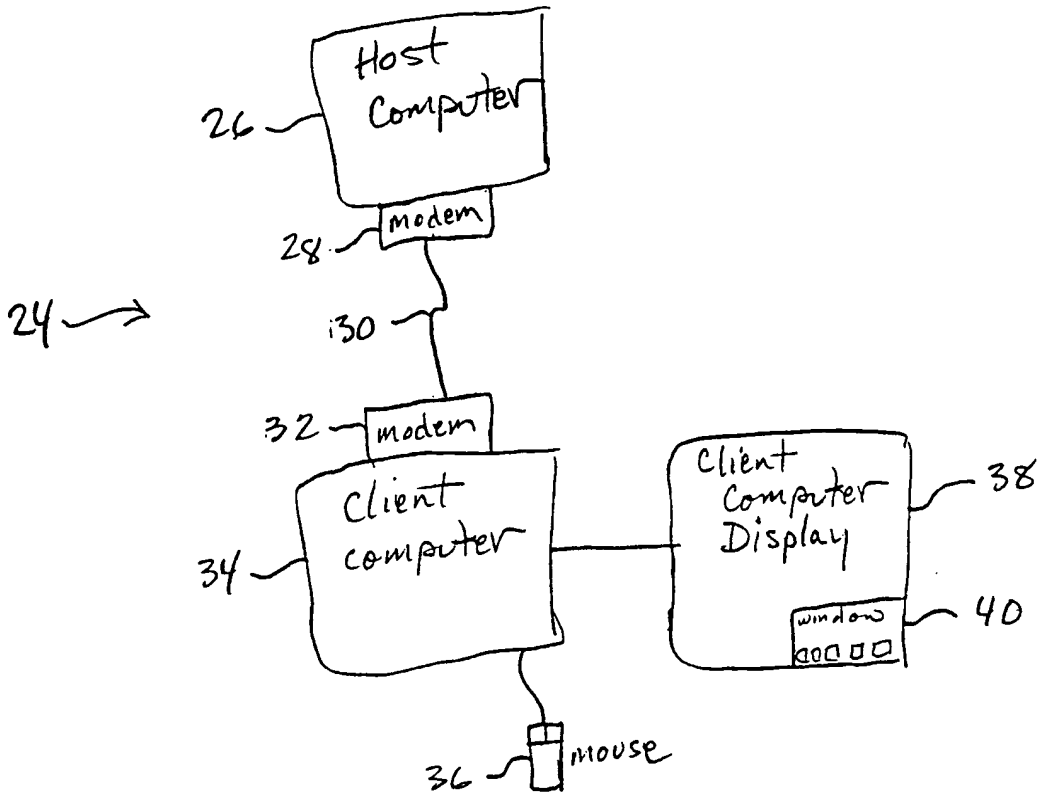
Host Computer
26
modem
28
24
30
32
modem
Client computer
34
Client Computer Display
38
window
40
mouse
36

FIG. 2

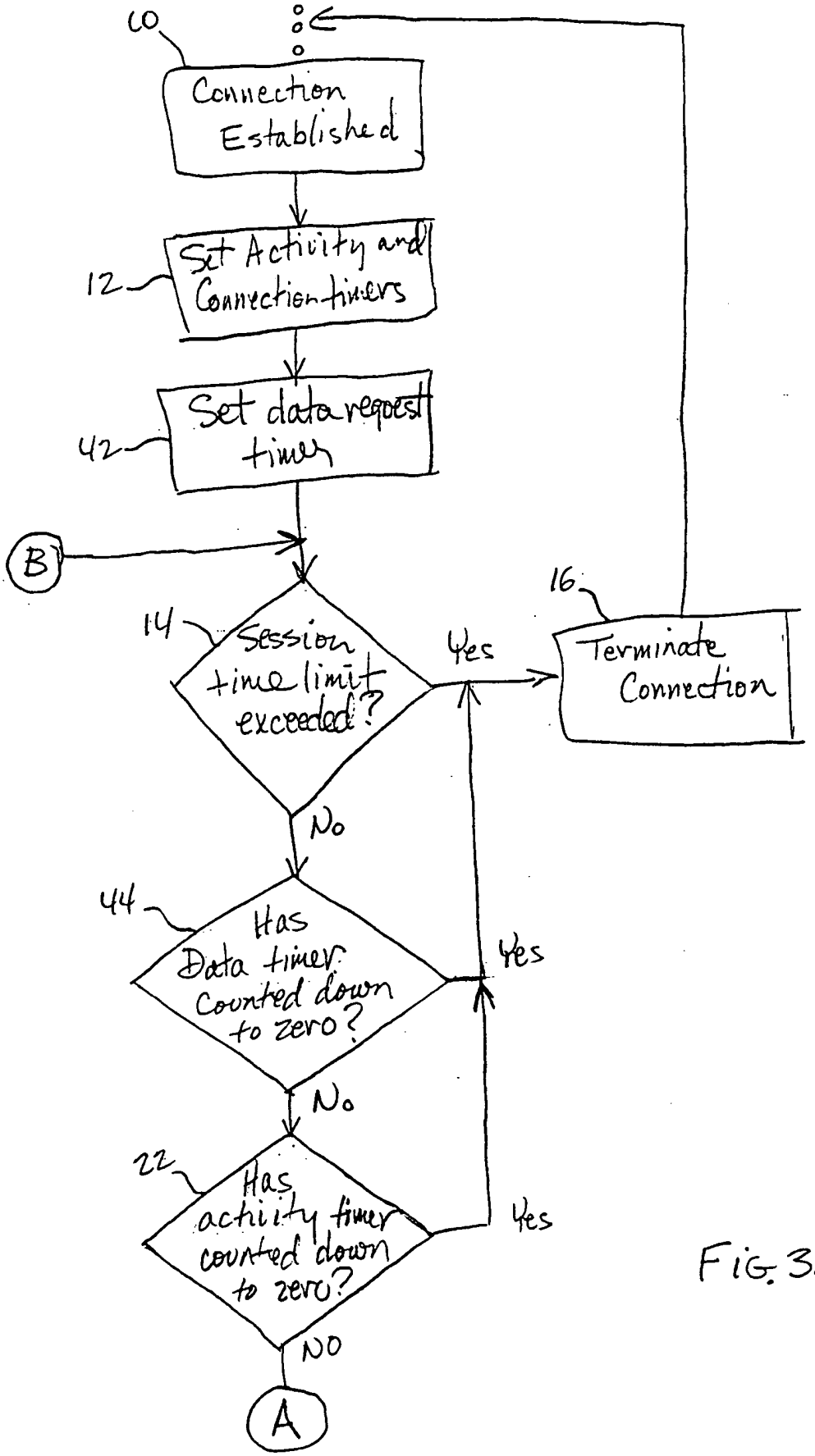
10
Connection Established
12
Set Activity and Connection timers
42
Set data request timer
B
14
Session time limit exceeded?
Yes
16
Terminate Connection
No
44
Has Data timer counted down to zero?
Yes
No
22
Has activity timer counted down to zero?
Yes
NO
A

FIG. 3A

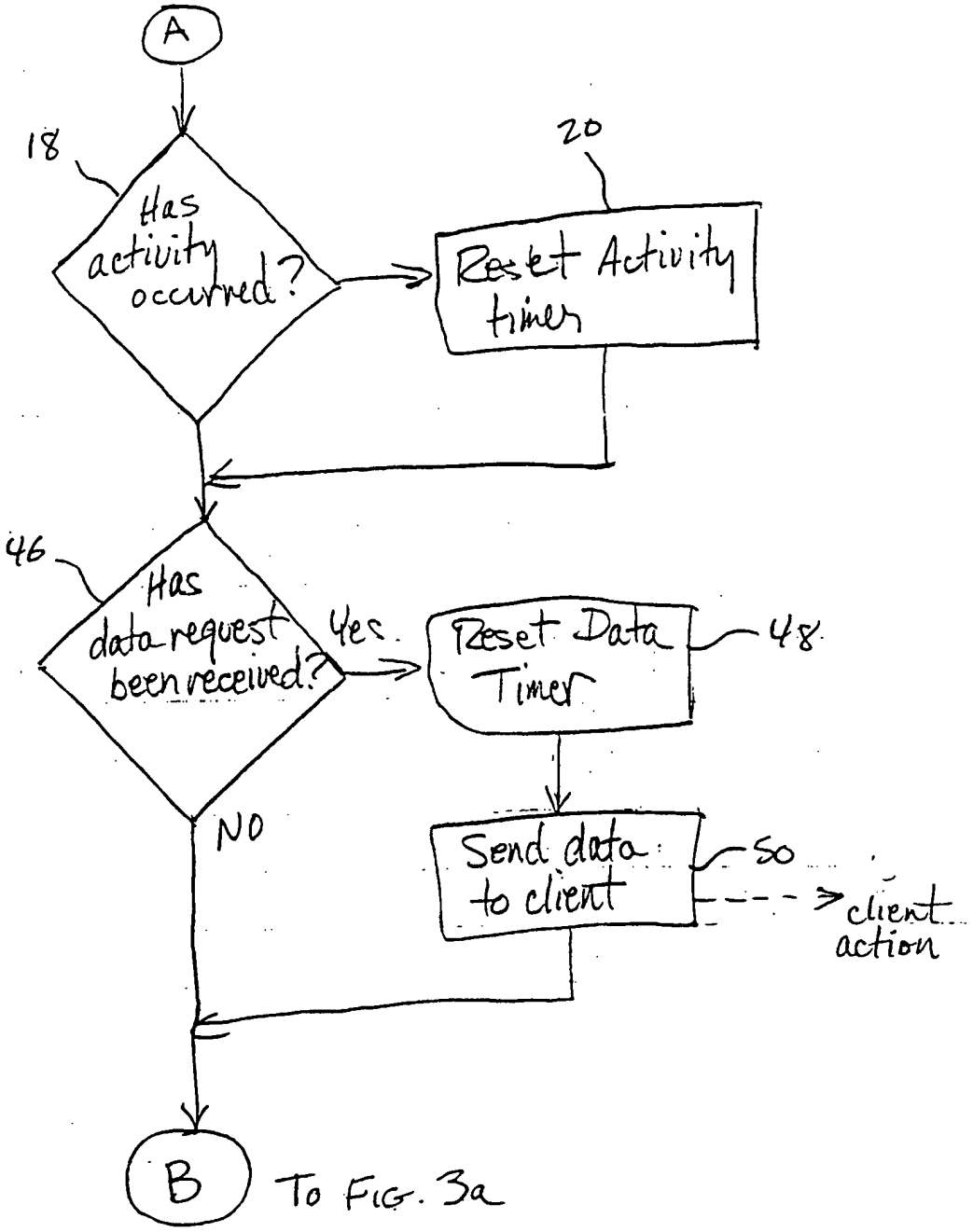
A
18
Has activity occurred?
20
Reset Activity timer
46
Has data request been received?
Yes
Reset Data Timer
48
NO
Send data to client
50
client action
B
To Fig. 3a

Fig. 3B

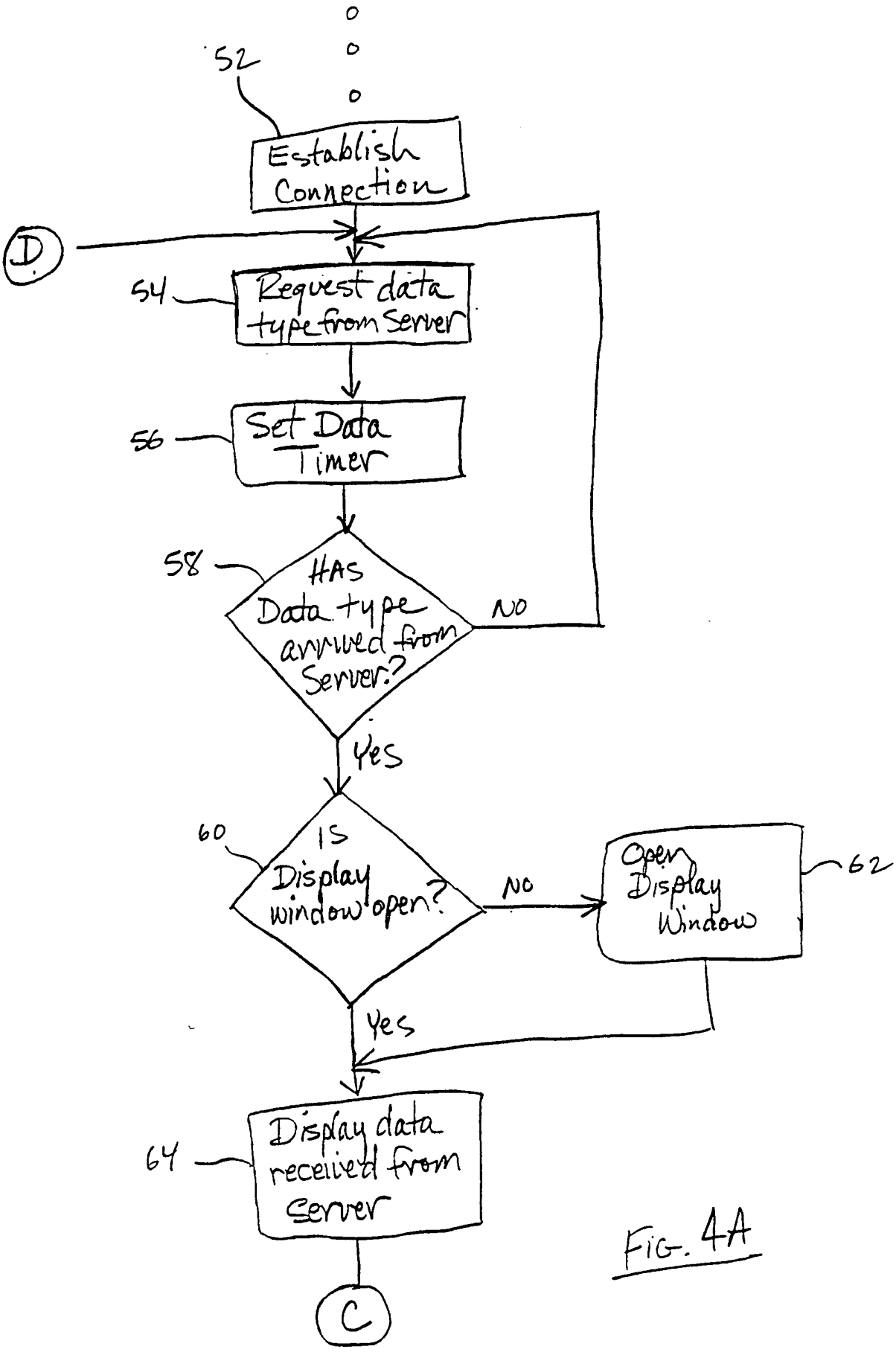
52
Establish Connection
D
54
Request data type from Server
56
Set Data Timer
58
HAS Data type arrived from Server?
NO
Yes
60
IS Display window open?
NO
Open Display Window
62
Yes
64
Display data received from Server
C

FIG. 4A

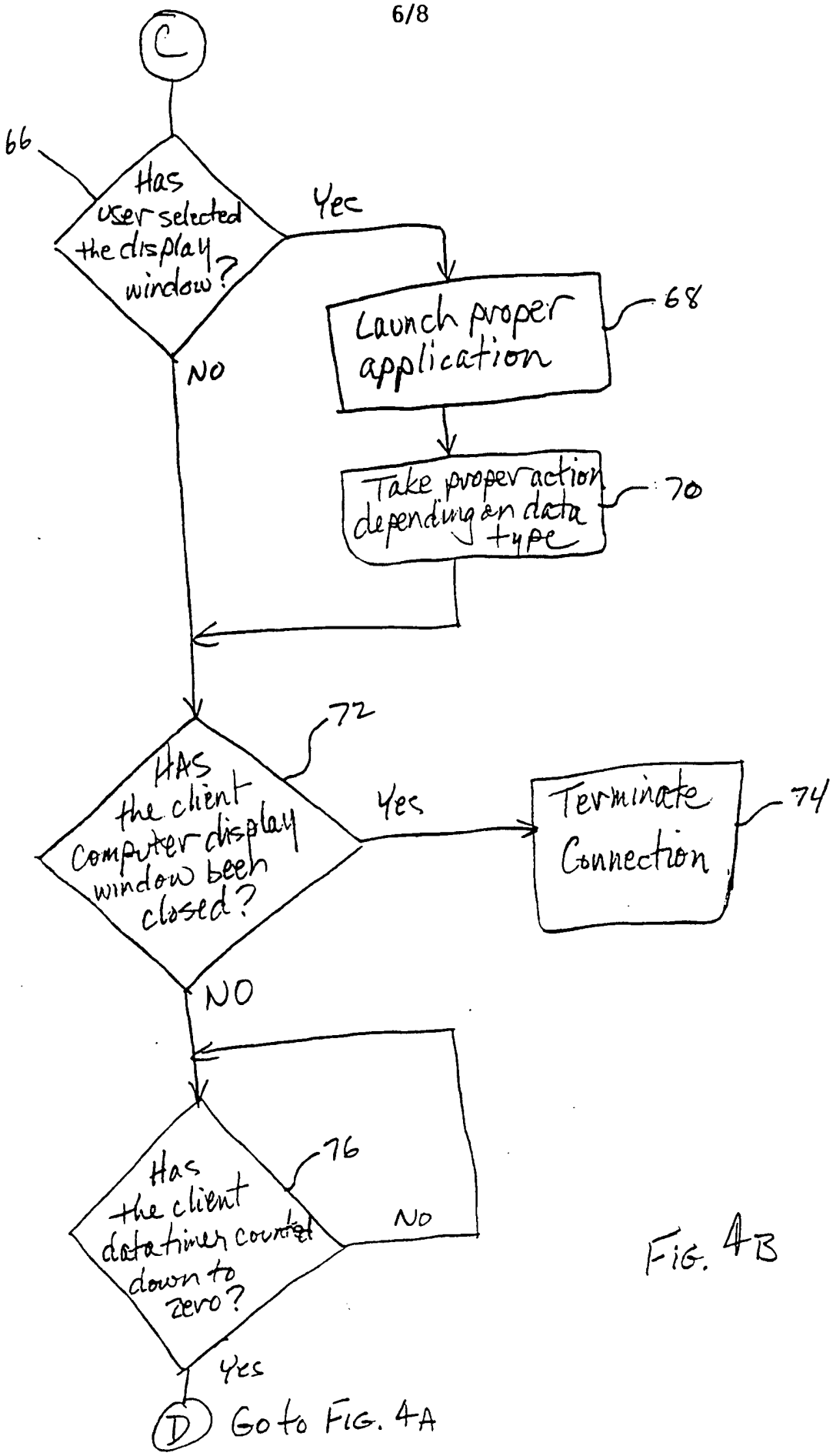
C
66
Has user selected the display window?
Yes
NO
Launch proper application
68
Take proper action depending on data type
70
72
HAS the client Computer display window been closed?
Yes
Terminate Connection
74
NO
Has the client datatimer counted down to zero?
76
No
Yes
D
Go to FIG. 4A

FIG. 4B

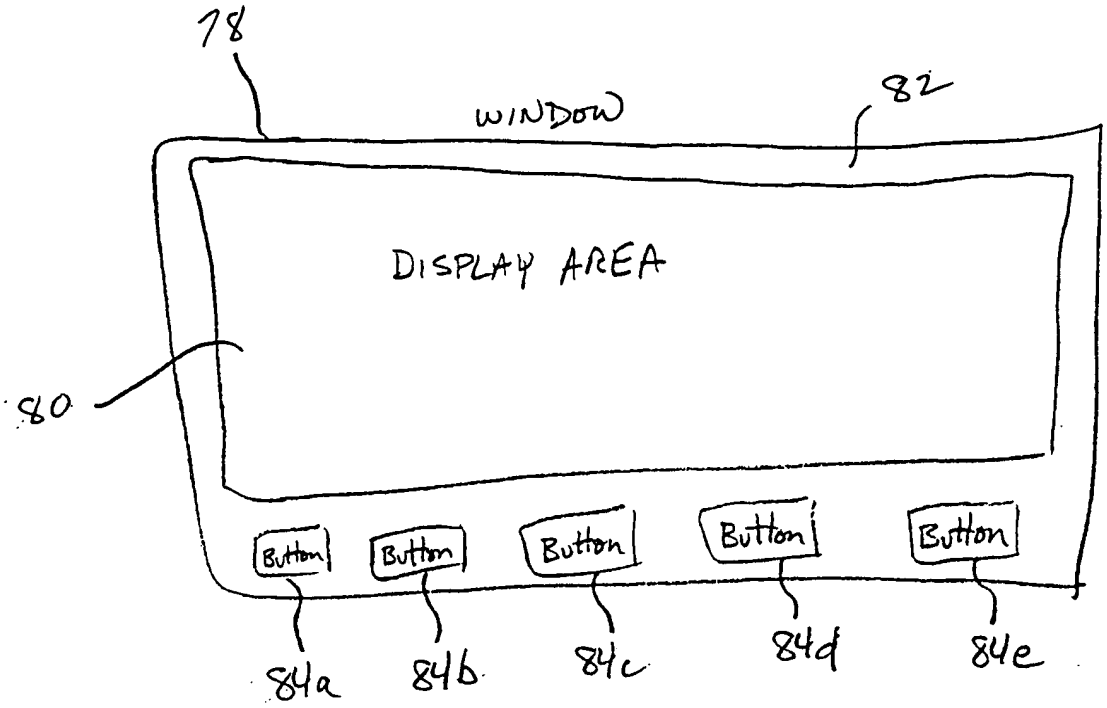
78
WINDOW
82
DISPLAY AREA
80
Button
Button
Button
Button
Button
84a
84b
84c
84d
84e

FIG. 5

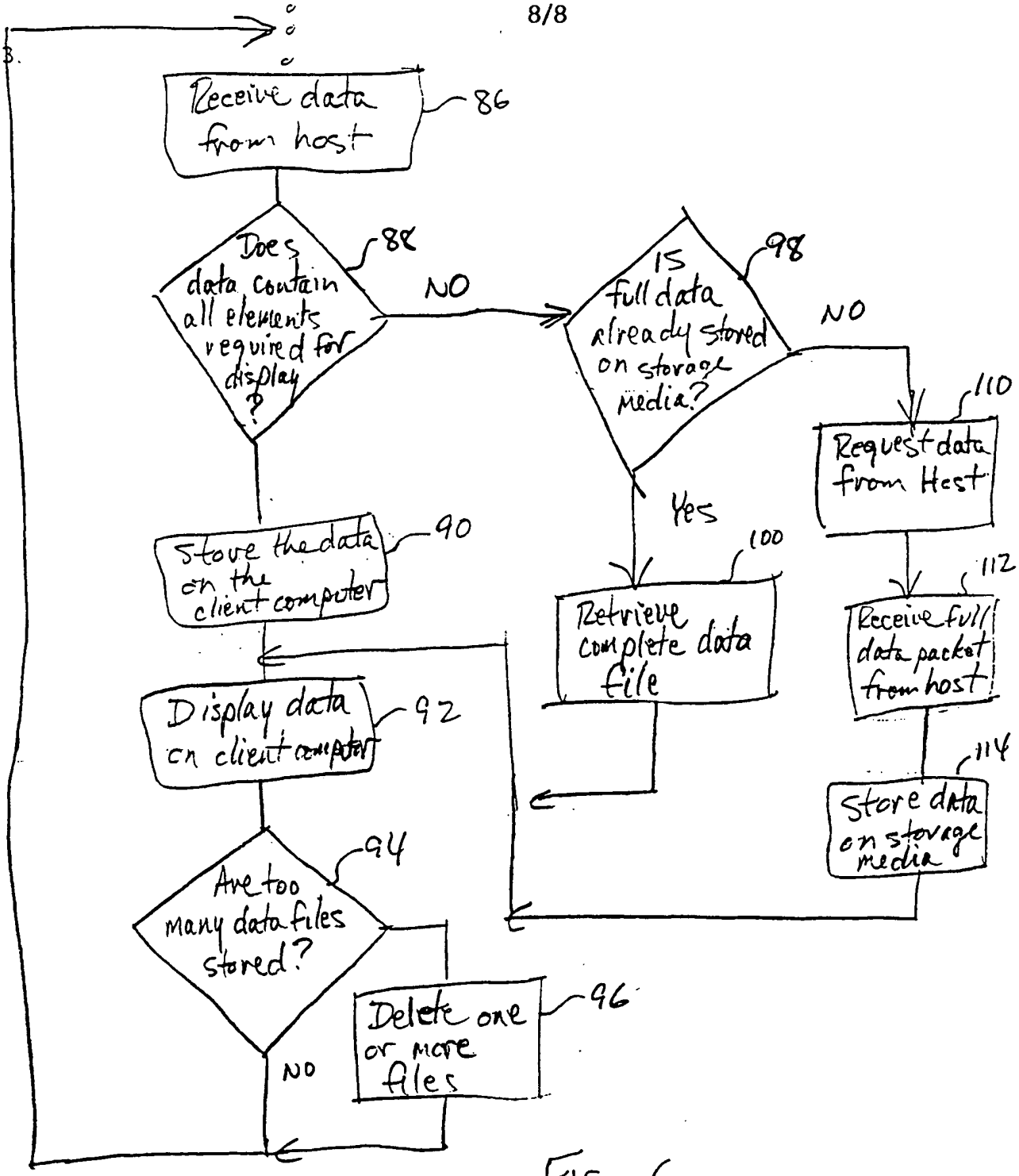
Receive data from host
86
Does data contain all elements required for display ?
88
NO
Is full data already stored on storage media?
98
NO
Yes
Request data from Host
110
Store the data on the client computer
90
Retrieve complete data file
100
Receive full data packet from host
112
Display data on client computer
92
Store data on storage media
114
Are too many data files stored?
94
Delete one or more files
96
NO

FIG. 6